SENSOPART

EYESIGHT Installationsanleitung
EYESIGHT Installation guide
Notice rapide EYESIGHT

FA 45

Smart Kamera - EYESIGHT
Smart camera - EYESIGHT
Système de Vision - EYESIGHT

300-AY
300-BY

Inhalt / Content

Deutsch 3
English 43
Français 84

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c UL us LISTED IND. CONT. EQ. 77HA
For use in class 2 circuits

For use in NFPA 79 Applications only.
Adapters providing field wiring means are available from the manufacturer. Refer to manufacturers information.

CE

Contents

Contents **43**
1 General Information and Safety **45**
1.1 Symbols 45
1.2 Safety notes 45
1.3 Components supplied 45
1.4 Requirements for use 45
2 Intended Use **46**
2.1 Field of application 46
2.2 Performance characteristics 46
2.3 An Overview of Commands for EYESIGHT Basic / EYESIGHT Advanced 47
2.3.1 EYESIGHT Basic 47
2.3.2 EYESIGHT Advanced 48
2.4 Smart camera types 48
3 Installation Instructions **49**
3.1 Mechanical Installation 49
3.2 Electrical installation 50
3.2.1 Connection possibilities 50
3.2.1.1 LED Display 50
3.2.1.2 Focusing screw 51
3.2.1.3 24 V DC Connection 51
3.2.1.4 LAN Connection 51
3.2.1.5 Data (RS422) Connection 51
3.3 Network settings 52
3.4 Start-up 53
4 Directory Structure on the PC **55**
4.1 Directory Structure 55
5 Communicating with the Camera **56**
5.1 Establishing a Connection 56
5.2 Setting up the Shutter and Gain 57
5.3 Creating an Inspection Program 59
5.4 Controlling a Camera (Remote Device Control) 62
5.5 Configuration of a Camera (Remote Device Configuration) 62
5.6 Properties of a Camera (Remote Device Properties) 63
5.7 Managing Multiple Cameras with one PC 64
6 Switching Between Inspection Programs **65**
6.1 Switching the Inspection Program from the PC 65
6.2 Switching the Inspection Program over a Serial Connection 65
6.2.1 Switching the inspection program 65
6.2.2 Mode of Operation: “Start” 66
6.2.3 Mode of Operation: “Stop” 66
6.2.4 Mode of Operation: “Stop immediately” 66
6.2.5 Mode of Operation: “Restart Program” 66
6.2.6 Mode of Operation: “Reset Counter” 66
6.2.7 Mode of Operation: “Trigger” 66
6.2.8 Mode of Operation: “Ping” 66
6.2.9 Mode of Operation: “RAW-Message” 66
6.2.10 6.2.10 Mode of Operation „RAW-ASCII-Message“ (available > version 2.4.036) 67
6.2.11 Mode of Operation: “Reset Camera” 67
6.2.12 Mode of Operation: “ExitEyeSight” 67
6.3 Switching the Inspection Program over LAN 67
6.3.1 Switching the inspection program 67
6.3.2 Mode of Operation: “Start” 68
6.3.3 Mode of Operation: “Stop” 68
6.3.4 Mode of Operation: “Stop immediately” 68
6.3.5 Mode of Operation: “Restart Program” 68
6.3.6 Mode of Operation: “Reset Counter” 68

6.3.7 Mode of Operation: “Trigger” 68
6.3.8 Mode of Operation: “Ping” 68
6.3.9 Mode of Operation: “RAW-Message” 68
6.3.10 Mode of Operation: „Set System Time“ (available > version 2.4.036) 69
6.3.11 Mode of Operation: “DeleteAllStaticVars” (available > version 2.4.036) 69
6.3.12 Mode of Operation: “SelectProgram” (available > version 2.4.036) 69
6.3.13 Mode of Operation: “AddProgram” (available > version 2.4.036) 69
6.3.14 Mode of Operation: “UnloadProgram” (available > version 2.4.036) 69
6.3.15 Mode of Operation: “SetParameterByName” (available > version 2.5) 69
6.3.16 Mode of Operation: “Reset Camera” 70
6.3.17 Mode of Operation: “ExitEyeSight” 70
6.3.18 Mode of Operation: “Softreset” 70
6.3.19 Mode of Operation: “Stoploops” 70
6.3.20 Mode of Operation: GetAllInfo 71

7 FAQ 72

8 Appendix 73

8.1 Field of view / operating distance 73
8.2 Plug connections 73
8.2.1 Serial port settings 73
8.2.2 IO-Box FA 45 74
8.2.3 Extension of In / and Outputs Beckhoff 75
8.3 Care and maintenance 77
8.3.1 Cleaning 77
8.3.2 Transport, packaging, storage 77
8.3.3 Disposal 77
8.4 Accessories 78

1 General Information and Safety

1.1 Symbols

Important
This symbol indicates sections of the text which must be strictly observed. Non-compliance with such instructions may cause injury or damage.

Note
This symbol indicates sections of the text which contain useful information.

1.2 Safety notes

Before starting the FA 45 Smart camera, read these instructions carefully, ensure that you have understood them and comply with them at all times.

The FA 45 Smart camera should only be connected by a qualified electrician.

Do not tamper with or make alterations on the unit!

The FA 45 Smart camera is not a safety-critical component and its use is prohibited under conditions where the safety of persons may depend on its function.

The IP address set for the FA 45 Smart camera should be marked on the enclosed label. After installation, stick the label on the smart camera in a clearly visible position.

⇨ The IP address of the FA 45 Smart camera must be used once only in any network. (see chapter 3.3 network settings)

1.3 Components supplied

- FA 45 Smart camera including integrated illumination
  (or as version with C-Mount lens without illumination)
- CD-ROM with Computer software and Operating instructions
- Operating instructions, mounting clamp, Allen key, screwdriver, 2 protective caps for M12 plug.

1.4 Requirements for use

To configure the FA 45 Smart camera, the following items are required: PC or noteboOK with min. Pentium III, 1 GHz, 256 MB RAM, Microsoft Windows 98, 2000, XP, or Vista™, network connection or network with TCP-IP protocol. Recommended resolution 1024 x 768 pixels. Basic knowledge of computing is also essential.
The IP address of the FA 45 Smart camera is set by the manufacturer to 192.168.100.100 with sub-net mask 255.255.255.0.
The operation of the FA 45 Smart camera is independent of a computer or PLC. A PC or noteboOK is required only for configuring the FA 45 #.
For reproducible results and avoidance of malfunctions, adequate and constant object illumination is essential.

Reflections or varying incident light may affect detection results.

⇨ If necessary, use an external white-light source and/or light-screening devices to exclude incident light.

2 Intended Use

2.1 Field of application

The FA 45 Smart camera is an optical sensor, which has numerous inspection methods for measuring, recognizing and distinguishing a vast range of different objects. FA 45 Smart camera is typically used e.g. in separating “good” parts from “bad” parts.

The typical field of application for FA 45 is in automation or quality control. FA 45 can be easily programmed for tasks like testing of presence, measuring, dimensional accuracy, integrity, position of e.g. markers, labels, packing or components.

The FA 45 Smart camera is therefore an economical alternative to conventional image-processing systems.

2.2 Performance characteristics

- FA 45 ¼”, Progressive Scan. CCD 640 (H) Y 480 (V), 25 Hz (monochrome or color).
- Fast signal processor (DSP), performance comparable to a fast Pentium PC-processor.
- Power supply 24 VDC +/- 10% (absolute maximum values 18-30V).
- 4 configurable outputs 0-24VDC PNP.
- Maximum current (per output) 200 mA (max. 9.6 W).
- Short circuit protection (all outputs).
- 2 configurable inputs, high 10…24V (+/-10%), low 0..3V.
- Trigger input, rising edge, 10V...Ub.
- Ethernet (LAN) interface.
- RS422 serial interface.
- Data output through Ethernet (LAN) or RS422.
- Compact sized smart camera: 64 x 45 x 45 mm
- Weight approx. 170 g.
- Protection standard IP 65/57.
- A large collection of commands (see Chapter 2.3) for creating an inspection program.
- Multiple inspection programs can be saved on the camera.
- Switching between inspection programs possible through serial connection, LAN or digital I/O.

2.3 An Overview of Commands for EYESIGHT Basic / EYESIGHT Advanced

EYESIGHT is available in Basic- and Advanced-versions. In addition to many additional commands all Basic-version commands are also included in the Advanced-version. The following tables contain a short description of the commands available.

2.3.1 EYESIGHT Basic

	Image capture Captures, saves and loads images.		**Point** Creates a point.		**Angle** Measures the angle between two straight lines or three points.
	Calibration Sets coordinate system origin and orientation. Adjusts scaling.		**Straight line** Creates a straight line.		**Interpreter control** Controls the flow of the inspection program by using jumps, marks etc.
	Read input Reads the camera's digital input and compares it with a set value.		**Circle** Creates a circle.		**Access to variables** Assigns values to variables and to the register. Executes arithmetic operations.
	Set output Sets the camera's digital output		**Distance** Measures the distance between two points or a point and a straight line.		**Evaluation** Evaluates a value against given tolerance limits.
	Text Writes text and/or values on the inspection image.		**Straight line distance** Measures the distance between a detected edge and a straight line.		**Probe points** Rectangular probe that detects an edge and marks it with points.
	Text string / LAN output Creating and sending of text strings through serial or LAN interfaces.		**Cross-section** Measures the cross-section between two detected edges.		**Probe points (circular probe)** Circular probe that detects an edge and marks it with points.
	RS232/422 Sends and receives text strings through the serial interface.		**Measure gap width** Measure the gap between two detected edges.		**Edge counter (straight line)** Counts edges along a straight line.
	Image information Evaluates brightness and focus of a selected image area.		**Calliper (hor./vert.)** Measures the hor. and vert. distance between two detected edges.		**Circle counter** Counts the edges along the circumferenceof a circle.
	Point list Modifies, resets, saves and loads the point list.		**Free calliper** Measures the distance between two detected edges. (Free orientation).		**Count objects** Counts objects with a defined area, brightness and distance from the center.
	Ini-file access Writes to and reads from a file on the camera flash-memory.				

2.3.2 EYESIGHT Advanced

In addition to the EyeSight Basic commands the following commands are also included in EyeSight Advanced.

	Select colour channel Filters out two of the three RGB-colour channels.		**Determine point of curve** Determines the bending of an object.		**Area check** Counts the number of pixels with a specific intensity value.
	Colour evaluation Determines the amount of pixels whose HSV-values lie within a defined range.		**Contour check** Compares a list of points with a contour of an object.		**Colour image area** Paints a circle-shaped area with a selected grey hue.
	Colour filter Similar to the „Colour evaluation" but also calculates the min, max and average values.		**Contour tracing** Saves the contour points along an outline of an object to the point list.		**Camera control** Set or read shutter and gain value.
	Brightness adjustment Sharpens the image by reducing the spreading of the grey values.		**Correlation** Compares the captured image with a template and calculates the correlation.		**Basic Interpreter** Script programming in a syntax similar to Visual Basic.
	Filter Various filter functions for a selected area.		**Riehmann-probe** Counts the edges along the projection of a selected area.		**Stop watch** Measures the time between marked rows in the inspection program.
	Delete backround An image defined as a background is subtracted from the captured image.		**Image transfer** Send camera image through LAN interface		**Execute sub-program** Sub programs can be loaded in the main program..

2.4 Smart camera types

Smart camera name	Description EYESIGHT Monochrome Basic	Article N°
FA 45-300-WCC-EBO6HS6	640x480 pixels, whitelight, CCD-mono, 6 mm objective	522-91133
FA 45-300-WCC-EBO12HS6	640x480 pixels, whitelight, CCD-mono, 12 mm objective	522-91134
FA 45-300-CC-EBOCSHS6 [1]	640x480 pixels, without light source, CCD-mono, C-mount	522-91135
FA 45-300-RCC-EBO6HS6	640x480 pixels, redlight, CCD-mono, 6 mm objective	522-91139
FA 45-300-RCC-EBO12HS6	640x480 pixels, redlight, CCD-mono, 12 mm objective	522-91140
Smart camera name	**Description EYESIGHT Monochrome Advanced**	**Article N°**
FA 45-300-WCC-EAO6HS6	640x480 pixels, whitelight, CCD-mono, 6 mm objective	522-91136
FA 45-300-WCC-EAO12HS6	640x480 pixels, whitelight, CCD-mono, 12 mm objective	522-91137
FA 45-300-CC-EAOCSHS6 [1]	640x480 pixels, without light source, CCD-mono, C-mount	522-91138
FA 45-300-RCC-EAO6HS6	640x480 pixels, redlight, CCD-mono, 6 mm objective	522-91141
FA 45-300-RCC-EAO12HS6	640x480 pixels, redlight, CCD-mono, 12 mm objective	522-91142
Smart camera name	**Description EYESIGHT Color Advanced**	**Article N°**
FA 45-300-WCCC-EAO6HS6	640x480 pixels, whitelight, CCD-color, 6 mm objective	522-91143
FA 45-300-WCCC-EAO12HS6	640x480 pixels, whitelight, CCD-color, 12 mm objective	522-91144
FA 45-300-CCC-EAOCSHS6 [1]	640x480 pixels, without light source, CCD-color, C-mount	522-91145

[1] When using a C-mount version of the FA 45, a C-mount objective with an intermediate ring 6.6 mm or a protective case is always needed (see Chapter 8.4 Accessories).

Higher resolutions available on request.

3 Installation Instructions

3.1 Mechanical Installation

To ensure maximum accuracy of detection, the FA 45 Smart camera should be protected from vibration.

Secure the connection cables with cable binders to prevent crushing or slipping.

Select a position for the FA 45 Smart camera in which interfering factors such as slight differences in the position of the object or variations in illumination have little or no effect.

Screw the FA 45 Smart camera into the mounting clamp „dovetail FA 45“ (supplied with the unit) and then onto a suitable object. Use only the mounting clamp „dovetail FA 45“ (no. 543-11000) supplied with the unit (see chapter 8.11 dimensional drawing).

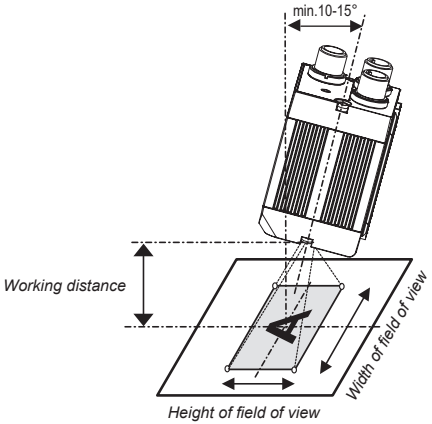


Fig. 1
15500231

Observe the object clearance given in the table Field of View / Working Distance (see chapter 8.5).

To avoid interfering reflection from the detection object, align the FA 45 Smart camera at an angle of approx. 10°-15° with reference to the optical axis (fig. 1).

Fine adjustment
Important: Fine adjustment of the FA 45 Smart camera should not be carried out until after electrical connection (see chapter 3.2) and start-up (PC software installation). See „Start-up“ (chapter 3.4).

3.2 Electrical installation

The electrical installation of the FA 45 Smart camera must be carried out by a qualified electrician.

When installing the FA 45 Smart camera , disconnect all electrical components from the power supply.

When the unit is being used in a network, ensure that the network address (IP address) of the FA 45 Smart camera set by the manufacturer at 192.168.100.100 is free and is not in use for any other unit connected to the system.
If necessary, re-set the IP address of the FA 45 Smart camera as described in the section „Network settings“ (see chapter 3.3).

When the FA 45 Smart camera is in use, the protective caps supplied must be pushed onto the M12 sockets (data and LAN) which are not in use. Failure to do this may cause malfunction.

3.2.1 Connection possibilities

For stand-alone operation (independent of PC /PLC) only connection 24 V DC (3.2.1.3) is required after start-up.

For electrical installation, connect wires as follows:

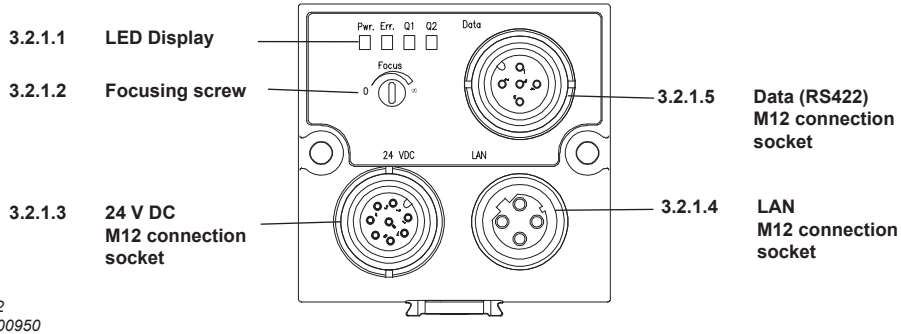


Fig. 2
155-00950

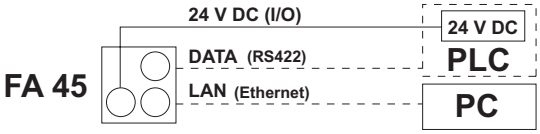


Fig. 3
155-00457

3.2.1.1 LED Display

Name	Colour	Meaning
Pwr.	Green	Camera ready, inspection program loaded
Err.	Red	Error in loading the inspection program
Q1	Yellow	Output 0 (OUT 0)
Q2	Yellow	Output 1 (OUT 1)

Table1

3.2.1.2 Focusing screw

Focusing screw to adjust focus (see Fig. 2).

3.2.1.3 24 V DC Connection

M12 Connection socket for 24 V DC voltage supply and digital I/O.
The exact plug connection see table2, chapter 8.2.

3.2.1.4 LAN Connection

M12 Connection socket for Ethernet connection.
The exact plug connection see table3, chapter 8.2.

Use only the correct network cables (see accessories table chapter 8.4).

Direct connection of the FA 45 Smart camera to a PC: (recommended):

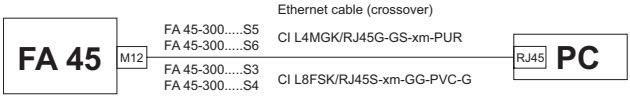


Fig. 4
155-00952

alternatively

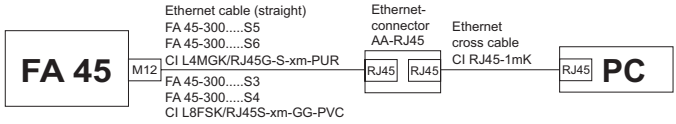


Fig. 5
155-00953

Connection of the FA 45 Smart camera to a PC via a network:

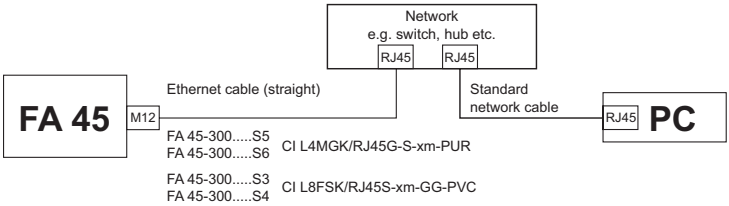


Fig. 6
155-00954

3.2.1.5 Data (RS422) Connection

M12 Connection socket for DATA serial interface, RS422.
The exact plug connection see table4, chapter 8.2.

3.3 Network settings

The following instructions indicate how to change the network configuration of the PC and the FA 45 Smart camera .
If incorrect settings are used, the network connectins in the computer may be lost.
To be on the safe side, note the former settings for later use if required.
Following this procedure, it may be necessary to re-start the system.
In order to determine which IP addresses are allowed in your network or locally in your PC, and to carry out the necessary settings on your PC, contact the system administrator beforehand.

The illustrations, dialogues and menus originate from the operating system Microsoft Windows XP™. The illustrations are similar in other operating systems.

To configure the FA 45 Smart camera with a PC it is essential that a network board and the TCP/IP LAN- connection is installed on the PC. (This also applies when the PC is not connected to a network. See also chapter 3.2, Electrical Connection).

To connect the Smart camera FA 45 to a PC via Ethernet the IP addresses of both devices have to correspond. The default IP of the FA 45 is 192.168.100.100/24 (/24 means: 24Bit Subnetmask = 255.255.255.0). To establish a direct connection, the PC must be set to a correspondig, fixed IP address like follows.

1. Click on Start ⇨ Control Panel ⇨ Network Connection ⇨ Local Area Connection ⇨ Properties ⇨ the window "Local Area Connection Properties" is open.
2. In the list „This connection requires following elements“ select the option „Internet Protocol (TCP/IP)“ and then click the button „Properties“.
3. In the following window set the desired IP address of the PC and the sub-network data.
4. Click on OK to save the settings.

Example:
The FA 45 Smart camera is pre-set to IP address 192.168.100.100 and subnet mask 255.255.255.0.
In this case, the IP address may be set to any value between 192.168.100.1 and 192.168.100.254, with the exception of the smart camera IP address (192.168.100.100).

For the smart camera IP address modification, see system start-up.

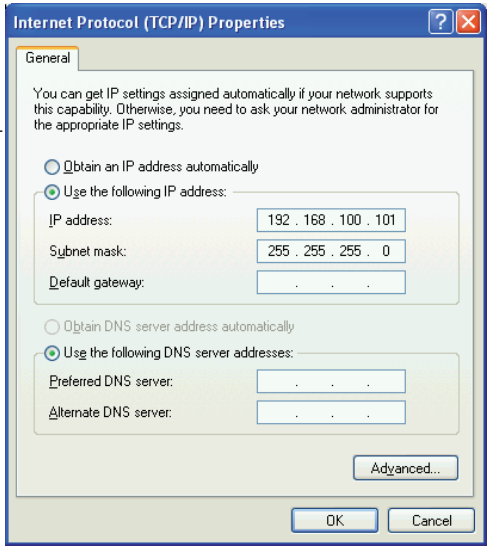

Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
192 . 168 . 100 . 101
Subnet mask:
255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

Fig. 7
155-00506

3.4 Start-up

The FA 45 Smart camera functions only with software supplied. Software updates are available from www.sensopart.de.
The PC Sofware must always fit to the corresponding Smart camera Firmware (VXX).

For installation of the software using Windows 2000, XP and Vista™ administration rights are necessary.

To start the FA 45 Smart camera up, proceed as follows:

1. Switch on the power supply (+U_B). If necessary, connect IN2 with +U_B (see chapter 8.1 IN 2).
2. For the first start-up of the FA 45 Smart camera install the supplied software (version x.x) on the PC. When the CD is inserted, the Internet Browser should start automatically. When the Autorun function is deactivated, it is also possible to start the main page by double click on start.exe.

De-installation
System control ⇨ Software ⇨ EYESIGHT ⇨ Remove
or
Start ⇨ Programs ⇨ SensoPart ⇨ EYESIGHT ⇨ Uninstall EYESIGHT

3. A program group “SensoPart\EYESIGHT” with a shortcut “EYESIGHT” will appear on the Windows start menu. The standard installation path is “C:\Program Files\SensoPart\EYESIGHT”.
4. The EYESIGHT-software can now be started by clicking ”Start ⇨ Programs ⇨ SensoPart ⇨ EYESIGHT ⇨ EYESIGHT”.

Fig. 8
155-00670

5. The graphical user interface for EYESIGHT-software after starting it for the first time: Click on „Configuration“ in order to start the Configuration mode.

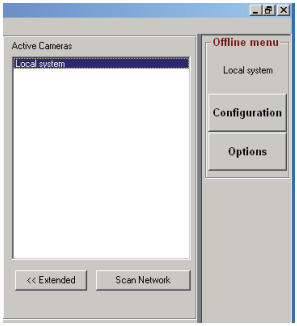


Fig. 8a
155-01287

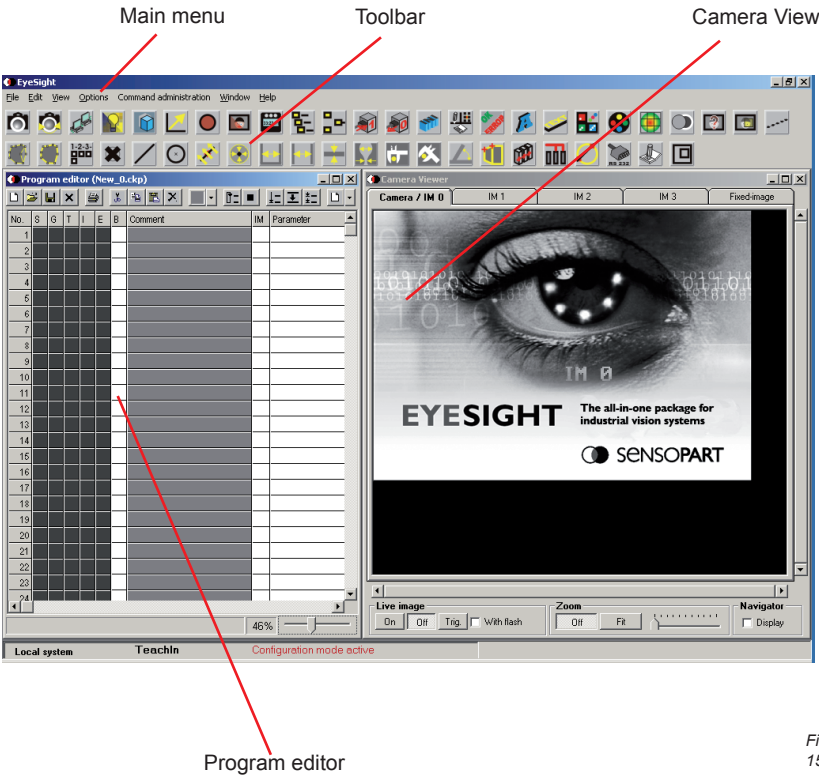


Fig. 9
155-00801

6. Selecting then on the main menu ”Window ⇨ Standard setting” opens “Camera Viewer”- and “Program Editor”-windows in case they were closed.

7. The installation of EYESIGHT has now been completed successfully.

8. See Chapter 5 for how to build a connection to a camera.
The EYESIGHT software can be exited by ”File ⇨ Quit”.

4 Directory Structure on the PC

4.1 Directory Structure

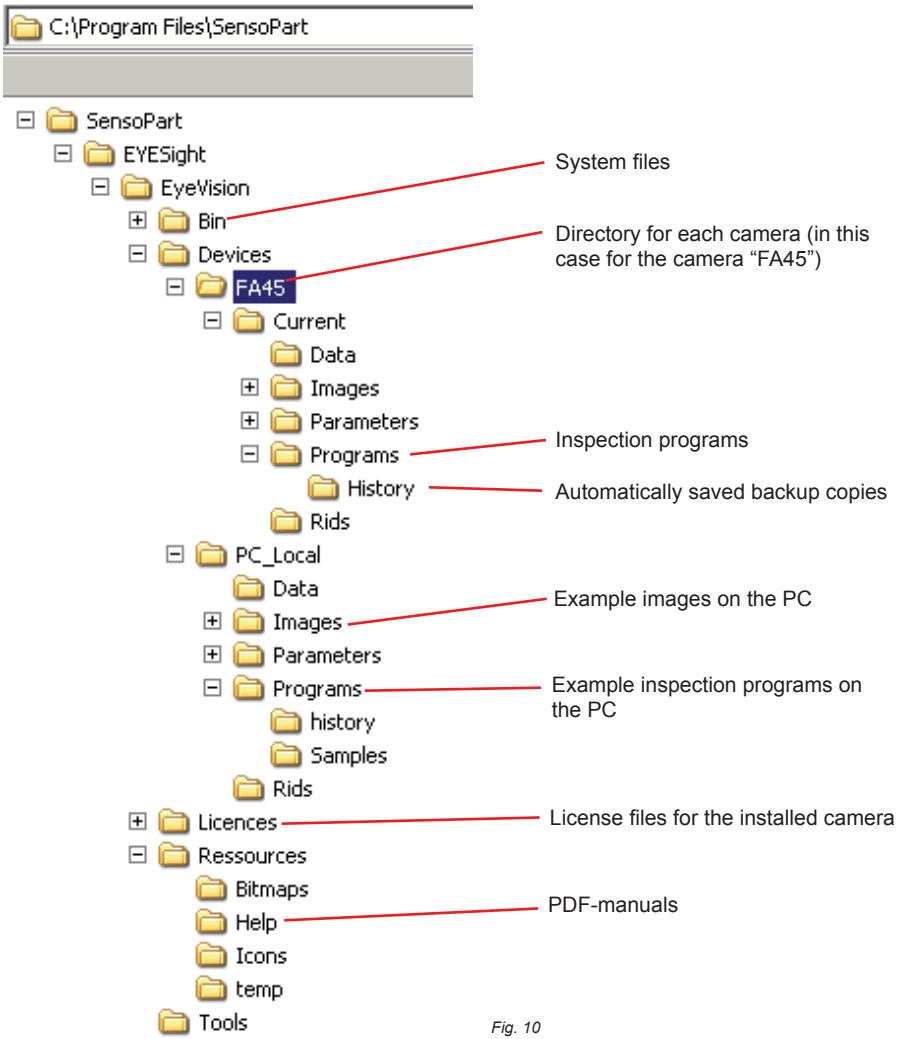


Fig. 10
155-00802

5 Communicating with the Camera

5.1 Establishing a Connection

After starting the EYESIGHT-software for the first time, it will put itself in a demo-mode with some restrictions in its functionality. To uplift the demo-mode, build a connection with a FA 45 camera in the EYESIGHT software, then disconnect and restart the EYESIGHT. If the software has not been connected to a camera for 3 days, it will revert to the demo-mode.

1. Start the EYESIGHT-software.
2. On the main menu select ”Options ⇨ Remote device control”.

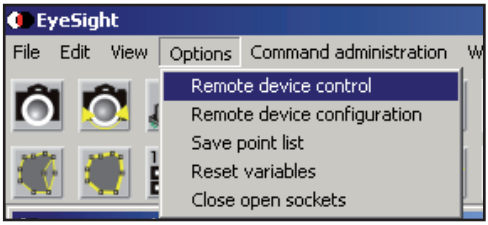


Fig. 11
155-00671

3. Choose camera model FA45 from the drop-down list.

   If you have multiple cameras connected (e.g. multiple cameras each with an unique IP-address in a network), the cameras will be listed here.

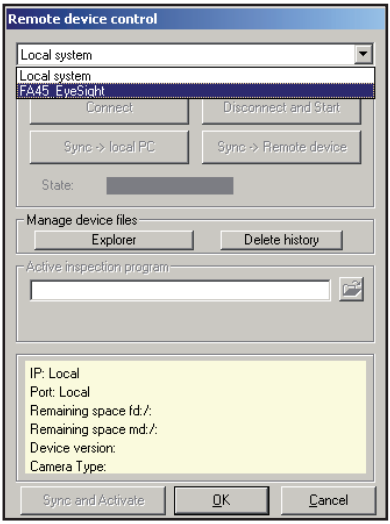


Fig. 12
155-00672

4. Click on “Connect”.

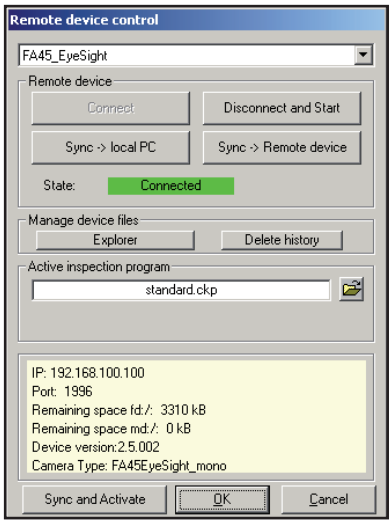


Fig. 13
155-00673

5. Click on the “Sync ⇨ Local PC” to copy all the files from the camera to the PC.

   Close the dialog by clicking “Ok”.

6. Activate the live image acquisition from the camera by clicking ”On” on the “Camera Viewer”-window. (Fig. 14a). The integrated flash for live image can be turned on by marking the checkbox “with flash” before clicking “On”.
   The image size can be adjusted to fit the window by clicking “Fit” under the text “Zoom”. The slide control can be used for closer zooming. Clicking “Off” will return the image to the original size (Fig. 14b). Turn the focus-screw on the backside of the camera (or using the lens objective on a C-mount camera) to reach the desired sharpness of the image.

Fig. 14a
155-00800

Fig. 14b
155-00806

5.2 Setting up the Shutter and Gain

The camera being connected, select ”View ⇨ Camera options” from the main menu.

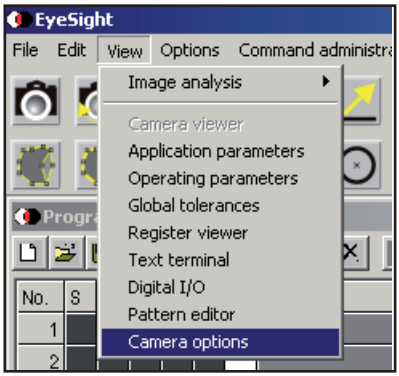


Fig. 15
155-00799

If you are acquiring live image from the camera (button “On” activated, see Fig. 14a) you will be able to see the effect on the image in real time when adjusting the values.

Use the sliding controls to set up the desired Shutter (in µs) and Gain values (Gain default: 255).
Clicking “OK” will close the window and save the new settings on the camera.

If a colour camera is used, you can adjust the white balance by clicking “Determine parameters”.

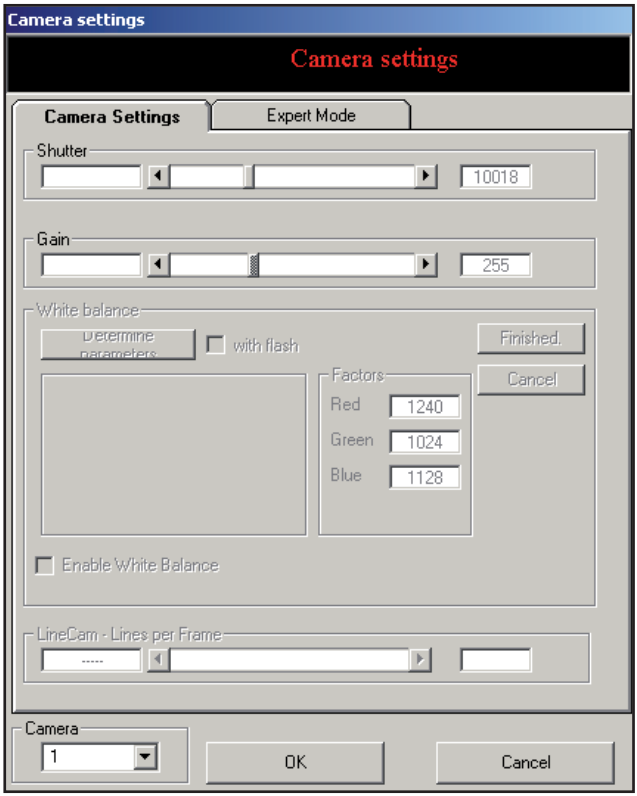


Fig. 16
155-00798

5.3 Creating an Inspection Program

1. Open an inspection program by clicking ”File ⇨ Open Program ⇨ standard.ckp” (or use the button “Open program” in the “Program Editor”-window). This will open the inspection program, which was earlier downloaded from the camera (with the command: “Options ⇨ Remote device control ⇨ “Sync ⇨ Local PC” ”).

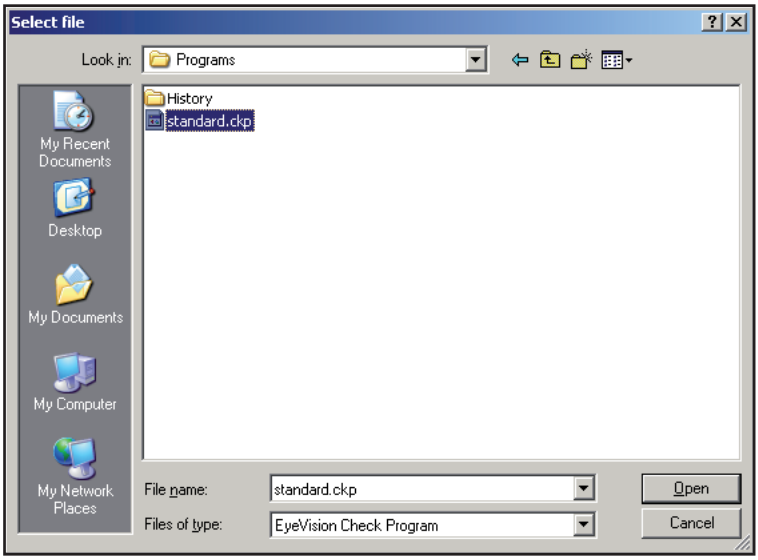


Fig. 17
155-00674

It is also possible to work with an inspection program without a camera. The live camera images can be saved and loaded with commands ”File -> Save image” (answer “No” when asked “With graphics”) and “File -> Load image”
When using the EYESIGHT software without camera, select “Local system” from the drop-down list in “Options -> Remote device control” in the main menu.

2. The commands to the Program editor – window are added using “drag and drop” method. The command icon must be dropped on the column “B” on the Program editor.

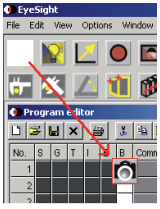


Fig. 18
155-00853

The dialog for each specific command opens automatically after it is dropped on its place on the Program editor.

Insert the command “Image capture” using “drag and drop” on the icon, enable the “with flash” and exit with “Ok”.

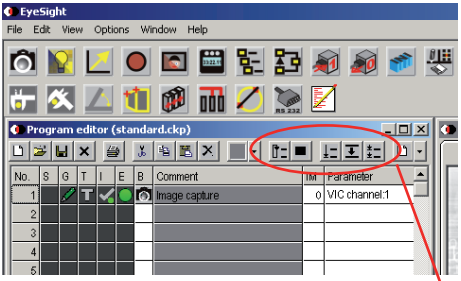


Fig. 19
155-00854

3. The inspection program can be run using the buttons seen in Fig. 20.

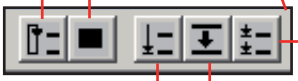


Fig. 20
155-00805

Click on “Check program - Start test-loop” to test your new inspection program. The camera flash should now be functioning and you should be able to see objects placed under the camera in real time.

The complete command reference can be found in the user manual (on the EYESIGHT installation CD) or through the help (press F1).

4. Save the program by clicking
   ”File ⇨ Save program” on main menu or on “Program editor”-window.
   You will be asked whether you want to commit the changes to camera (Fig. 10).

The maximum length for the inspection program filenames is 8 characters (8 for the name and 3 for the ending).

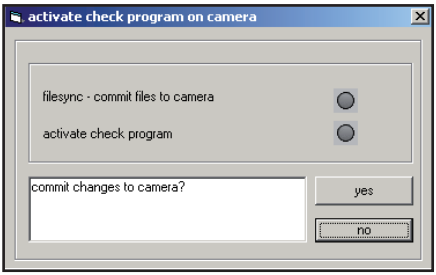


Fig. 21
155-00804

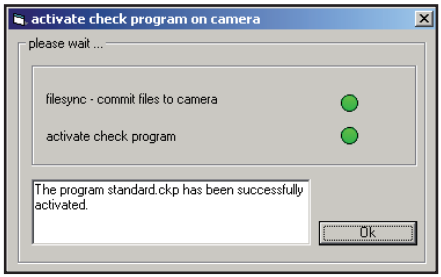

activate check program on camera
please wait ...
filesync - commit files to camera
activate check program
The program standard.ckp has been successfully activated.
Ok

Fig. 22
155-00803

If you select “No” at this point, it is possible to copy the saved inspection program later to the camera by: “Options -> Remote device control -> “Sync -> Remote device” “.
The inspection program copied to the camera is the one displayed under “Active checkprogram”.

The inspection program on the camera starts as soon as the button “Disconnect and start” is clicked.

5.4 Controlling a Camera (Remote Device Control)

Select from the main menu: ”Options -> Remote device control”.

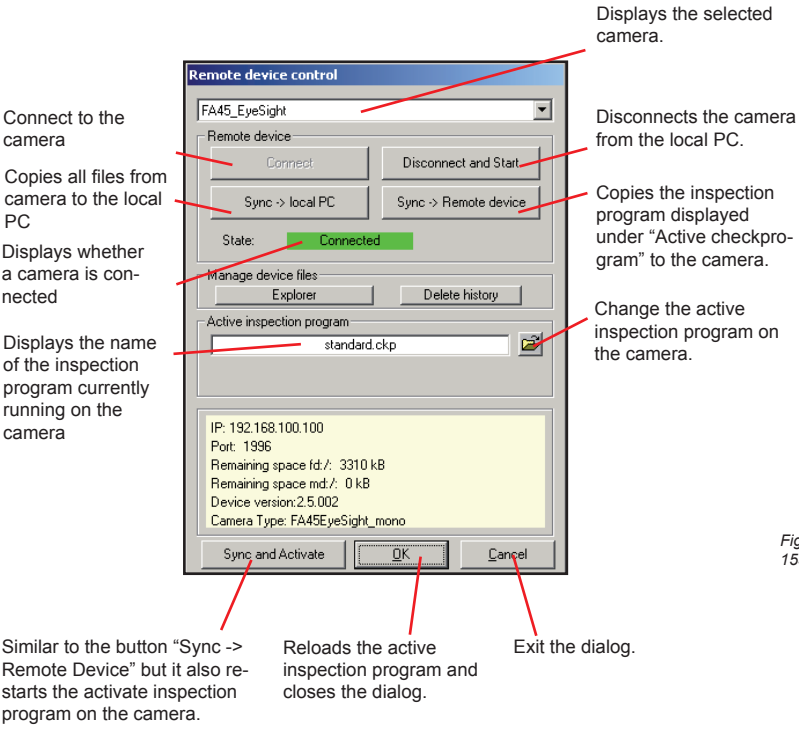

Displays the selected camera.
Remote device control
FA45_EyeSight
Remote device
Connect
Disconnect and Start
Sync -> local PC
Sync -> Remote device
State:
Connected
Manage device files
Explorer
Delete history
Active inspection program
standard.ckp
IP: 192.168.100.100
Port: 1996
Remaining space fd:/: 3310 kB
Remaining space md:/: 0 kB
Device version:2.5.002
Camera Type: FA45EyeSight_mono
Sync and Activate
OK
Cancel
Connect to the camera
Copies all files from camera to the local PC
Displays whether a camera is connected
Displays the name of the inspection program currently running on the camera
Disconnects the camera from the local PC.
Copies the inspection program displayed under “Active checkprogram” to the camera.
Change the active inspection program on the camera.
Similar to the button “Sync -> Remote Device” but it also restarts the activate inspection program on the camera.
Reloads the active inspection program and closes the dialog.
Exit the dialog.

Fig. 23
155-00673

5.5 Configuration of a Camera (Remote Device Configuration)

Click “Options -> Remote device configuration” on the main menu.

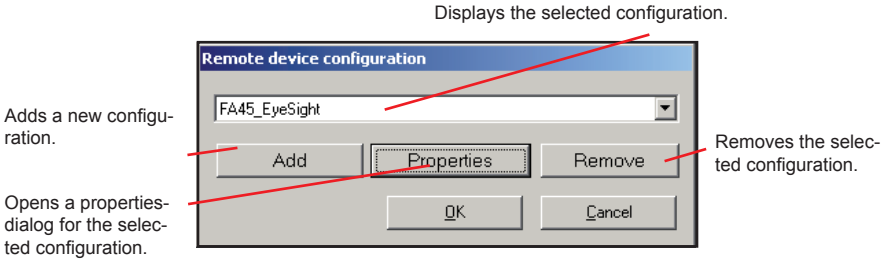
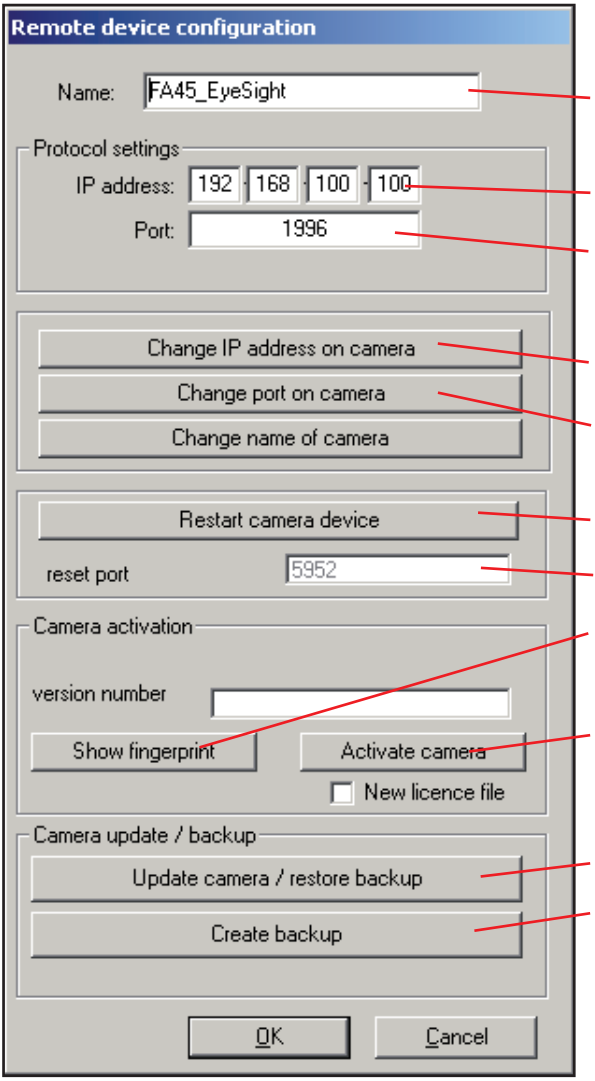


Fig. 24
155-00676

5.6 Properties of a Camera (Remote Device Properties)

Click on the “Properties” and then “Yes” to close the connection.



Selected camera.

IP-address of the camera.

Port number for the connection.

Button to change the IP address.

Button to change the port.

Button to reset the camera.

Port for reset the camera.

Displays the fingerprint and version number, which is used as a unique identification for every EYESIGHT-camera.

Activate of the camera with a license file.

Update the camerasoftware / restore the backupfile

Creates a backup of the camera firmware and inspection programs.

Fig. 25
155-00677

5.7 Managing Multiple Cameras with one PC

It is possible to manage and configure multiple cameras connected through a network. Therefore each camera has to be given a unique IP-address.

1. Click “Options -> Remote device configuration” on the main menu. Select the first camera (FA45) and click on the “Properties”-button.

2. Click on the “Change IP address on camera” and type in a new IP, e.g. 192.168.100.90. The delivered cameras have a default IP address of 192.168.100.100. Before changes for the IP-address take place, the camera has to be restarted. Click “Ok” on the dialog and then again “Ok” on the configuration dialog.

3. To add a new camera, click “Add” on the “Remote device configuration”-dialog. Give a new name for the camera (e.g. “camera 1”) and leave the dialog with “Ok”.

4. Select the newly added camera from the drop-down list and click on “Properties”.

5. Follow the instructions as in step 2 and change the IP-address on the camera (e.g. 192.168.90.91).

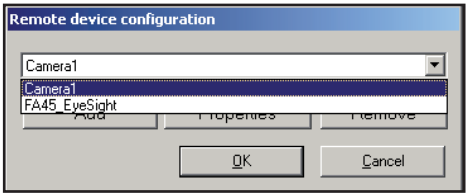


Fig. 26
155-00797

6. If you wish add more cameras, start over at step 3 giving the camera a new name (e.g. “camera 2” and so on).

6 Switching Between Inspection Programs

Multiple inspection programs can be stored on the camera. E.g. this way can each inspected part type have its individual inspection program. There are various ways of switching between the inspection programs.

6.1 Switching the Inspection Program from the PC

Connect the camera to your PC with a LAN-cable and select from the main menu: “Options ⇨ Remote device control ⇨ Connect”. Choose the inspection program to be activated in “Active checkprogram”-field.

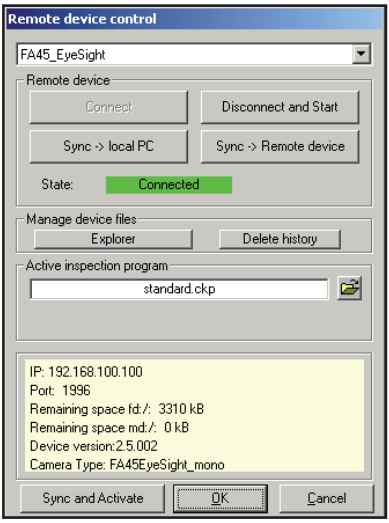


Fig. 27
155-00673

6.2 Switching the Inspection Program over a Serial Connection

The serial control command begins always with an “#”-character and followed by three digit command code, an optional text field and ending with an “#” (e.g. “#001standard.ckp#”). In View ⇨ Application parameters ⇨ Autom. progr. control it is possible to decide whether an acknowledgement is sent or not.

If the camera does not receive the complete command in 10 seconds, a timeout takes place and the inspection program execution continues normally.

6.2.1 Switching the inspection program

Command: #001<programname># (e.g. #001standard.ckp#)

This command changes the active inspection program to “<programname>”. The program name must always end with the suffix “.ckp”. The program loop begins executing immediately if the camera is in “start”-mode. In “stop” mode the new inspection program will be loaded, but not started. The filename is case sensitive.

6.2.2 Mode of Operation: “Start”

Command: **#002#**

In this mode the currently active inspection program will be started. If the inspection program is switched during this mode, it will start immediately.

6.2.3 Mode of Operation: “Stop”

Command: **#003#**

The currently running inspection program loop will execute until the program end and stop. If the inspection program is switched during this mode, it will not be started until the “start” -command is given.

6.2.4 Mode of Operation: “Stop immediately”

Command: **#004#**

The inspection program will be stopped **immediately**. All blocking operations will be stopped (e.g. waiting for trigger or input signal). After a program switch the new program will stay stopped until the operation mode “Start” has been chosen. Use this command to abort “endless loops” in the script editor and waiting for trigger signal.

6.2.5 Mode of Operation: “Restart Program”

Command: **#005#**

The inspection program will be stopped immediately and started again. This command matches to the “Stop immediately“ command followed by “Start”.

6.2.6 Mode of Operation: “Reset Counter”

Command: **#006#**

Reset of good-/bad counter on the camera.

6.2.7 Mode of Operation: “Trigger”

Command: **#007#**

With this command it is possible to trigger the camera with the serial connection. In the command “image capture” the flag **HW-triggered** has to be set.

6.2.8 Mode of Operation: “Ping”

Command: **#008#**

After the camera has received this command, it is answered with “OK” (even when the acknowledgements are disabled). With this command it is possible to check if the camera is working.

6.2.9 Mode of Operation: “RAW-Message”

Command: **#009CCLM0…Mn-1#**

Use this telegram to send a message **M= M_0...M_{n-1}** to an inspection program. The message length is limited to 65.000 bytes. The cubic capacity of the message will be written as input to the serial buffer of the active inspection program. So it is possible to use it with the RS232 command or EVHDRS232Receive function inside the script editor.

The command code #009 is followed by two configuration bytes **CC**, that should be filled with 0 (=0x00).
The configuration bytes will be used for a specification of check sums or other extensions in later versions. The next byte L describes the length n of the cubic capacity **M= M_0...M_{n-1}** in bytes.

Should the cubic capacity **M** have more than 255 characters, **L** has to be set to 0 (=0x00) and the following 2 bytes (interpreted as 16 bit value (LSB first)) describe the length. In this case the telegram has the form: #009**CC**0**LH**M_0... M_{n-1}#, where **L** and **H** stand for low and high byte of the message length **n**.

6.2.10 6.2.10 Mode of Operation „RAW-ASCII-Message“ (available > version 2.4.036)

Command: #019L:M#

L = message length (ASCII)
M = Message itself (ASCII)

The telegram RAW-ASCII-Message is possible when only ASCII-messages are required.
With this telegram it is possible to send a message M to an inspection program. The message will be written as input to the serial buffer of the active inspection program. The command code #019 is followed by two character strings separated with a “:” (punctuation mark - colon). The first character string L in ASCII specifies the length of the message M. The second character string M in ASCII is the message itself ending with a “#”. For the length only the characters of the message M are counted (without “#”).

6.2.11 Mode of Operation: “Reset Camera”

Command: #998#

A softreset of the camera will be done.

6.2.12 Mode of Operation: “ExitEyeSight”

Command: #999#

The EyeSight software running on the camera will be stopped immediately. The actual check-program is stopped. After this command it is not possible to establish a connection to the camera with the EyeSight PC software. A softreset via Ethernet or serial is not possible. Is is not possible any more to use EyeControl for a direct camera control.
It is still possible to get access to the camera via telnet (e.g. for an update of the operating system on the camera).
The EyeSight software can be started again by entering “es.cex” on the telnet-console.

6.3 Switching the Inspection Program over LAN

The control command over LAN (using UDP) begins always with an “#”-character and followed by three digit command code, an optional text field and ending with an “#” (e.g. “#001standard.ckp#”). The port number for switching commands is 5952 (> version 2.1.xxx). In version 2.0.3 the port number is one higher than the port number for EYESIGHT
connection (by default port 1997). The IP address is the same as for the EYESIGHT-connection.
The camera sends always a reply after receiving a command:

1. If the command parsing was successful and the command was recognized, the reply is “ok”.
2. If the parsing command was completed successfully but the co mmand was NOT recognized (e.g. #099#), the reply is “nok”.
3. If the command could not be parsed, the command string is sent as a reply back to the sender (e.g. for debugging purposes).
4. If EYESIGHT-software is connected to the camera, the reply is “IGNORED”.

To protect the system from inconsistencies, all switching commands via LAN to the camera are ignored while being connected to the camera with the EYESIGHT-software.

6.3.1 Switching the inspection program

Command: #001<programname># (e.g. #001standard.ckp#)

This command changes the active inspection program to “<programname>”. The program name must always end with the suffix “.ckp”. The program loop begins executing immediately if the camera is in “start”-mode. In “stop” mode the new inspection program will be loaded, but not started.

6.3.2 Mode of Operation: “Start”

Command: #002#

In this mode the currently active inspection program will be started. If the inspection program is switched during this mode, it will start immediately.

6.3.3 Mode of Operation: “Stop”

Command: #003#

The currently running inspection program loop will execute until the program end and stop (maybe the camera is waiting for a trigger or an input signal). If the inspection program is switched during this mode, it will not be started until the “start”-command is given.

6.3.4 Mode of Operation: “Stop immediately”

Command: #004#

The inspection program will be stopped **immediately.** All blocking operations will be stopped (e.g. waiting for trigger or input signal). After a program switch the new program will stay stopped until the operation mode “Start” has been chosen. Use this command to abort “endless loops” in the script editor and waiting for trigger signal.

6.3.5 Mode of Operation: “Restart Program”

Command: #005#

The inspection program will be stopped immediately and started again. This command matches to the “Stop immediately” command followed by “Start”.

6.3.6 Mode of Operation: “Reset Counter”

Command: #006#

Reset of good-/bad counter and the number of program-cycles on the camera.

6.3.7 Mode of Operation: “Trigger”

Command: #007#

With this command it is possible to trigger the camera with the LAN interface. In the command “image capture” the flag **HW-triggered** has to be set.

6.3.8 Mode of Operation: “Ping”

Command: #008#

After the camera has received this command, it is answered with “OK” (even when the acknowledgements are disabled). With this command it is possible to check if the camera is working.

6.3.9 Mode of Operation: “RAW-Message”

Command: #009CCLM$_0$...M$_{n-1}$#

Use this telegram to send a message **M= M$_0$...M$_{n-1}$** to a inspection program. The message length is limited to 65.000 bytes. The cubic capacity of the message will be written as input to the serial buffer of the active inspection program. So it is possible to use it with the RS232 command or EVHDRS232Receive function inside the script editor.
The command code #009 is followed by two configuration bytes **CC**, that should be filled with 0 (=0x00).
The configuration bytes will be used for a specification of check sums or other extensions in later versions. The next byte **L** describes the length **n** of the cubic capacity **M= M$_0$...M$_{n-1}$** in bytes.

Should the cubic capacity **M** have more than 255 characters, **L** has to be set to 0 (=0x00) and the following 2 bytes (interpreted as 16 bit value (LSB first)) describe the length. In this case the telegram has the form: #009**CC**0**LHM$_0$**... **M$_{n-1}$**#, where **L** and **H** stand for low and high byte of the message length **n**.

6.3.10 Mode of Operation: „Set System Time“ (available > version 2.4.036)

Command: #010 <Sec> <Minute> <Hour> <Day> <Month> <Year>#

The system time on the camera is set with the following parameters. After the number of the command #010 six parameters separated with a space bar have to be entered.

<Sec> 0 - 59
<Minute> 0 - 59
<Hour> 0 - 24
<Day> 1 - 31
<Month> 1 - 12
<Year> 1900 –

6.3.11 Mode of Operation: “DeleteAllStaticVars” (available > version 2.4.036)

Command: #014#

All static variables are deleted.

6.3.12 Mode of Operation: “SelectProgram” (available > version 2.4.036)

Command: #016<Programname>#

The inspection program <Programname> is selected and is ready for execution. <Programname> is the complete name of the inspection program (e.g. “Std.ckp”). When the inspection program is already in the memory (RAM) (e.g. as a sub-program or added with the command “Add Program” (#017)) then the program can be started immediately without loading from the flash memory and without activating. It is recommended to use this command when the camera is in the “Stop” mode of operation (see command #003# and #004#).

6.3.13 Mode of Operation: “AddProgram” (available > version 2.4.036)

Command: #017<Programname>#

The inspection program <Programname> is loaded in the memory (RAM) and is activated. <Programname> is the complete name of the inspection program (e.g. “Std.ckp”). All inspection programs remain in the memory. In order to start the chosen inspection program it has to be selected (see command #016). It is recommended to use this command when the camera is in the “Stop” mode of operation (see command #003# and #004#). Otherwise the cycle-time of the active program might be influenced. Use the combination #016# and #017# in order to avoid long loading and activating times when switching inspection programs on the camera. Inspection programs in the memory (RAM) can be removed by switching the inspection program with #001#. Please take care of the amount of memory (RAM). It depends on the camera type and the inspection programs on the camera how many inspection programs can be loaded at the same time.

6.3.14 Mode of Operation: “UnloadProgram” (available > version 2.4.036)

Command: #018<Programname>#

A softreset of the camera will be done.

6.3.15 Mode of Operation: “SetParameterByName” (available > version 2.5)

Command: #020 <Position>;<ParType>;<ParName>;<Value>#

<Position>: Position of the command in the inspection program
<ParType>: parametertype string, double, long
0 – String
1 – Double
2 – Long
<ParName>: Name of the parameter
<Value>: new value

6.3.16 Mode of Operation: “Reset Camera”

Command: #998#

A softreset of the camera will be done.

6.3.17 Mode of Operation: “ExitEyeSight”

Command: #999#

The EyeSight software running on the camera will be stopped immediately. The actual check-program is stopped. After this command it is not possible to establish a connection to the camera with the EyeSight PC software.
A softreset via Ethernet or serial is not possible. Is is not possible any more to use EyeControl for a direct camera control.
It is still possible to get access to the camera via telnet (e.g. for an update of the operating system on the camera). The EyeSight software can be started again by entering “es.cex” on the telnet-console.

6.3.18 Mode of Operation: “Softreset”

Command: RESET

A softreset of the camera will be done. Analog to #998# in 6.3.10.

6.3.19 Mode of Operation: “Stoploops”

Command: STOPLOOPS

With this command it is possible to interrupt running processes on the camera. This command is also used from the EyeSight PC-software in order to establish a connection to the camera, if the camera is hanging in an interminable process. It is not recommended to use this command. In order to stop an inspection program the command “Stop immediately” (see 6.3.4) should be used.

6.3.20 Mode of Operation: GetAllInfo

Command: GETALLINFO

After having received this command the camera sends a character string with information of the camera status. The following information is sent: camera type, version of operating system, the software version on the camera, information of the actual inspection program, cycle time and information of the licence on the camera.
The category groups are divided by a byte with hex=00.

Description of the GETALLINFO protocol (version 1):

Protocol Version	1
Camera Name	
Camera Type	ES <NR>00
Camera IP	
Camera Color Type	0 = grey 10 = color
Connect-Port	
Control-Port	
Software-Version	
OS Version	
Valid Licence File	0 = Licence ok 1 = Licence File Error (Demo Mode)
Licence covers program	0 = undetermined 1 = Licence covers program 2 = Additional Licence needed
Current Program Program Status	0 = Stopped 1 = Running else = Erro
Cycle Time	
Good Counter	
Bad Counter	
Serial Program Control Active	0 = disabled 1 = enabled
Digital IO Program Control Active	0 = disabled 1 = enabled

7 FAQ

1. **When using triggered image capture, command dialogs in the command column "B" open only after clicking "Stop".**

   Answer:
   When a new command is added or an existing command on the command-column "B" is clicked, the EYESIGHT-software runs through all the previous commands. In case of triggered image capture, the inspection program execution will not continue until it receives the trigger signal.
   Workarounds:
   - Right mouse click on a command icon on the "Program editor"-window and choose "Quick edit" (the previous inspection commands will not be executed using this command).
   - Click on the column "S" on the "Program editor"-window in front of the image capture- icon to disable it for the duration of editing.
   - Unmark the dialog box "Triggered" in the "Image capture"-command dialog for the duration of editing.

2. **I cannot connect to the camera.**

   Answer:
   Try to ping the camera. This is done by clicking in Windows "Start->Run…->cmd" and typing in the command prompt e.g. "ping 192.168.100.100" (i.e. the IP-address your camera has).

3. **I cannot set any outputs, receive data via serial and/or Ethernet interfaces.**

   Answer:
   Check if the pins are correctly connected. The serial and LAN- interfaces are activated by a license on a camera. Try reloading the license to the camera.

4. **Some commands on the camera are not functioning.**

   Answer:
   The EYESIGHT-software package is delivered in Basic and Advanced versions. All the commands are not include in the Basic-version. For an overview of all available commands, see Chapter 2.3.

5. **Good parts are identified as NOK.**

   Answer:
   Check the threshold values and tolerances in your inspection program. Make sure that your lighting conditions are adequate. By making use of the Calibration-tool, build an alignment function to determine the orientation of the part.

6. **The colours on the camera are distorted (bluish, reddish or greenish cast)**

   Answer:
   Adjust the white balance ("View -> Camera options -> White balance")

8 Appendix

8.1 Field of view / operating distance

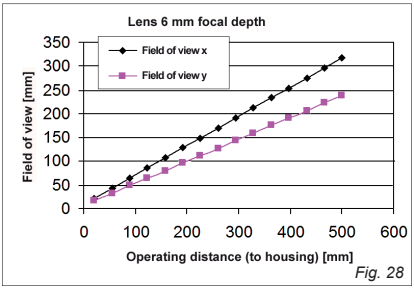


Fig. 28

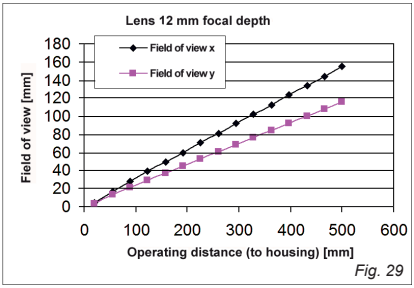


Fig. 29

8.2 Plug connections

PIN assignment, connection 24 V DC

PIN	Colour	Use
1	White	IN0 (external trigger)
2	Brown	$+U_B$ (24 V DC)
3	Green	OUT2
4	Yellow	OUT1, display LED = Q2
5	Grey	IN1
6	Pink	OUT0, display LED = Q1
7	Blue	GND
8	Red	OUT3

Table 2

PIN assignment, connection LAN

(M12) 4 pin	(M12) 8 pin	Color	PIN (RJ45)	Use 1:1	PIN (RJ45)	Use Crossover
1	6	Yellow	1	TxD+	3	RxD+
2	5	Withe	3	RxD+	1	TxD+
3	4	Orange	2	TxD-	6	RxD-
4	8	Blue	6	RxD-	2	TxD-

Table 3

PIN assignment DATA (RS422)

PIN	Color	Use
1	White	RxD+
2	Brown	RxD-
3	Green	TxD+
4	Yellow	TxD-
5	Grey	GND

Table 4

8.2.1 Serial port settings

- Speed: 9600 bps
- Data bits: 8
- Parity: none
- Stop bits: 1
- Flow control: none

The settings can be changed in View ⇨ Applikation parameters ⇨ System ⇨Connection settings (COM). (available > version 2.3.xxx)

8.2.2 IO-Box FA 45

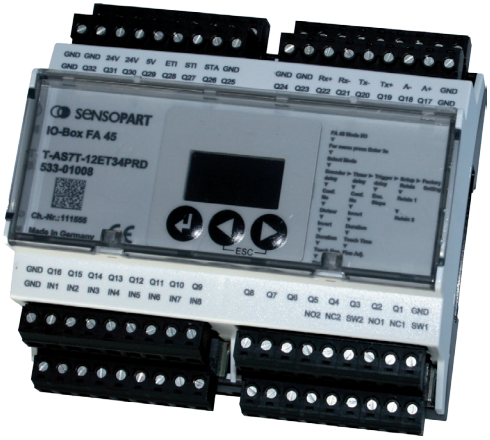


Fig. 30
155-01091

The IO-Box converts serial data from the sensor's RS422 interface to up to 32 discrete signal outputs, whereby an output of individual results is possible without complex PLC programming.
Reversely, data can be transferred to the sensor via 8 inputs, for example to switch over the parameter set for a change in product. Ejector control can be carried out on the basis of encoder steps, independent of belt speed, via an additional encoder input. The IO-Box can be used with all versions of the FA 45 EyeSight which are equipped with a RS422 interface. The module is easily configured via three operating keys and a display.

The IO-Box is activated in the selection menu "View => Application parameters => Beckhoff IO", by selecting "8 inputs / 32 outputs".

8.2.3 Extension of In / and Outputs Beckhoff

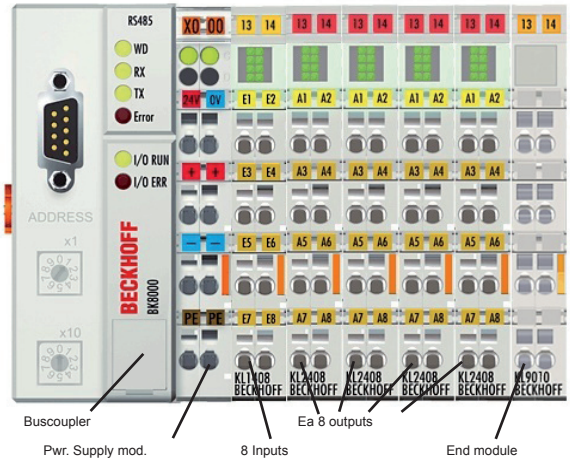


Fig. 30a
155-00745

The extension of the in- and outputs is done by clamps with buscoupler as shown in the picture on the top. The buscoupler can be equipped with a different number of in- and outputs.
View ⇨ Application parameters ⇨ Beckhoff IO
The configuration of the buscoupler has to be selected in the software.
The Beckhoff - module is set to baud rate 38400 by default.
If Beckhoff-mode in smart camera software is selected, the baud-rate of the serial interface of the smart camera will automatically be set to 38400 baud.

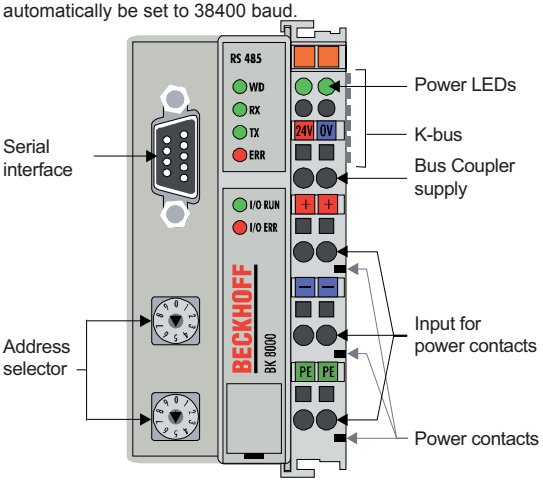


Fig. 31
155-00961

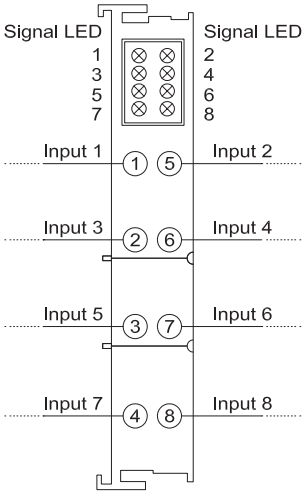
Connect supply voltage and inputs/outputs to the buscoupler as described in the documentation of the buscoupler. The supply voltage of the bus coupler and the supply voltage of in- outputs are electrically isolated. For correct function of in- outputs the power contacts must be connected to power supply. Select by the switches named with „ADDRESS“ node number 11. Connect the serial interface of the smart camera with the serial interface of the buscoupler as shown in the following table:

Cable to buscoupler

FA 45		Sensopart Cable e.g. Cl L5FK-3m-W-PUR	Beckhoff BK8000	
GND	5	Grey	GND	5
TxD A	4	Yellow	RxD / TxD A	8
TxD B	3	Green	RxD / TxD B	3
RxD A	2	Brown		
RxD B	1	Withe		

The extension of In- and Outputs not available at serial numbers smaller than 0802376 and can not be installed by using the update-functionality.

Important: Please note pin assignment. It is not identical with the input marking.



Input marking	Pin assignment
1	1
2	5
3	2
4	6
5	3
6	7
7	4
8	8

Fig. 32
155-00779

8.3 Care and maintenance

8.3.1 Cleaning

Clean the FA 45 Smart camera with a clean dry cloth.
If the smart camera front screen is soiled, clean it with a soft cloth and some plastic cleaning agent where required.

Important
Never use aggressive cleaning agents and solvents or benzine.
Do not use sharp objects. Do not scratch!

8.3.2 Transport, packaging, storage

Check the delivery upon receipt to ensure that it is complete and that no damage occurred during transport. Should the delivery be damaged, contact the carrier immediately. When returning the smart camera, the packaging must always be sufficient solid

INFORMATION
If a defect is found, a complaint must be made immediately. Claims can only be made within the valid time limit.

8.3.3 Disposal

Electronic components are subject to hazardous waste treatment and must only be disposed of by certified specialists.

8.4 Accessories

Description	Designation	Article N°
Mounting clamp, dovetail FA 45	MK 45	543-11000
Mounting angle FA 45	MA 45	543-11001
Mounting angle FA 45 long	MA 45 L	543-11013
Mounting bloc rod FA 45	MB 45	543-11002
Mounting rod 20 cm FA 45	MST 45-20	543-11005
Mounting rod 30 cm FA 45	MST 45-30	543-11006
Mounting rod 40 cm FA 45	MST 45-40	543-11007
Mounting hinge FA 45	MG 45	543-11008
Mounting plate FA 45	MP 45	543-11003
Mounting link FA 45	MZ 45	543-11004
Connection cable, 2 m, straight, shielded	C L8FSK-2m-G-PUR	902-51708
Connection cable, 5 m, straight, shielded	C L8FSK-5m-G-PUR	902-51709
Connection cable, 10 m, straight, shielded	C L8FSK-10m-G-PUR	902-51710
Connection cable, 2 m, 90°, shielded	C L8FSK-2m-W-PUR	902-51711
Connection cable, 5 m, 90°, shielded	C L8FSK-5m-W-PUR	902-51712
Connection cable, 10 m, 90°, shielded	C L8FSK-10m-W-PUR	902-51713
Ethernet cable, 3 m M12, 8-pin./RJ45, shielded (no crossover)	CI L8FSK/RJ45S-3m-GG-PVC	902-51715
Ethernet cable, 3 m M12, 8-pin./RJ45, shielded (crossover)	CI L8FSK/RJ45S-3m-GG-PVC-G	902-51736
Interface cable I/O extension, 3 m straight	CI L5FK-D9MS-3m-G-PUR	902-51757
Interface cable I/O extension,, 3m	CI L5FK-D9MS-3m-W-PUR	902-51758
Interface cable I/O extension,, 5m straight	CI L5FK-D9MS-5m-G-PUR	902-51759
Interface cable I/O extension,, 5m	CI L5FK-D9MS-5m-W-PUR	902-51760
Ethernet cable, 3 m, M12, straight, 4-pol, D-codiert/RJ45, shielded (patch)	CI L4MGK/RJ45G-S-3m-PUR	902-51761
Ethernet cable, 3 m, M12, straight, 4-pol, D-codiert/RJ45, shielded (crossover)	CI L4MGK/RJ45G-GS-3m-PUR	902-51762
Ethernet cable, 5 m, M12, straight, 4-pol, D-codiert/RJ45, shielded (patch)	CI L4MGK/RJ45G-S-5m-PUR	902-51763
Ethernet cable, 5 m, M12, straight, 4-pol, D-codiert/RJ45, shielded (crossover)	CI L4MGK/RJ45G-GS-5m-PUR	902-51764
Ethernet cable, 10 m, M12, straight, 4-pol, D-codiert/RJ45, shielded (patch)	CI L4MGK/RJ45G-S-10m-PUR	902-51765
Ethernet cable, 10 m, M12, straight, 4-pol, D-codiert/RJ45, shielded (crossover)	CI L4MGK/RJ45G-GS-10m-PUR	902-51766
Ethernetadapter cable, 0,2m, M12, 8-pol, male/M12, 4-pol, male	CI L8MGK/L4MGK-S-0,2m-PUR	902-51773
Ethernet connector RJ45, shielded	AA-RJ45	902-51694
Ethernet crossover cable, 1 m, RJ45, shielded	CI RJ45S 1m K	902-51695
Interface cable 3 m, straight	CI L5FK-3m-G-PUR	902-51696
Interface cable x m, straight (max. 25 m)	CI L5FK-xm-G-PUR	902-51697
Interface cable 3 m, 90°	CI L5FK-3m-W-PUR	902-51698
Interface cable x m, 90° (max. 25 m)	CI L5FK-xm-W-PUR	902-51699
Converter RS232 - RS 485/422	K2-ADE-TB	533-11017
Interface cable incl. CD Rom 2 m - USB-RS 232	CUSB-RS232-2m	901-05097
C-mount Lens 8 mm	LO C 8	526-51513
C-mount Lens 12 mm	LO C 12	526-51514
C-mount Lens 16 mm	LO C 16	526-51515
C-mount Lens 25 mm	LO C 25	526-51516
C-mount Lens 50 mm	LO C 50	526-51518
Intermediate ring 1.6 mm	LR 1,6	543-11009
Intermediate ring 6.6 mm	LR 6,6	543-11010
C-Mount predective case, flange 6.6 mm [1]	LPT 45 CM 6,6	527-51130
Arealight FA 45 White	LF 45 W	525-51136
Arealight FA 45 IR [2]	LF 45 IR	525-51137
Arealight FA 45 Red	LF 45 R	525-51144
Ring light, White, double row	LFR 45 WD	525-51139

Description	Designation	Article N°
Ring light, IR, double row [2]	LFR 45 ID	525-51141
Ring light, Red, double row	LFR 45 RD	525-51143
I) Illumination D16x200/D60 X=350	LZS 08230-50	525-51122
I) Illumination D16x360/D60 X=580	LZS 13230-50	525-51123
I) Illumination D26x420/D70 X=940	LZS 18230-67	525-51126
II) Illumination D26x420/45x108 X=635[3]	LZS 18024-54	525-51124
II) Illumination D26x420/45x108 X=635[3]	LZS 18230-54	525-51125
II) Illumination D26x1000/45x108 X=1245[3]	LZS 36024-54	525-51127
Ringlight, 32 mm, white	LR 32 W-24-KFL5	532-51000
Ringlight, 56 mm, white	LR 56 W-24-KFL5	532-51001
Ringlight, 70 mm, white	LR 70 W-24-KFL5	532-51002
Ringlight, 32 mm, red	LR 32 R-24-KFL5	532-51003
Ringlight, 56 mm, red	LR 56 R-24-KFL5	532-51004
Ringlight, 70 mm, red	LR 70 R-24-KFL5	532-51005
Ringlight, angle, 50 mm white	LR 50 WW-24-KFL5	532-51006
Ringlight, angle, 74 mm white	LR 74 WW-24-KFL5	532-51007
Ringlight, angle, 90 mm white	LR 90 WW-24-KFL5	532-51008
Ringlight, angle, 132 mm white	LR 132 WW-24-KFL5	532-51009
Ringlight, angle, 50 mm red	LR 50 RW-24-KFL5	532-51010
Ringlight, angle, 74 mm red	LR 74 RW-24-KFL5	532-51011
Ringlight, angle, 90 mm red	LR 90 RW-24-KFL5	532-51012
Ringlight, angle, 132 mm red	LR 132 RW-24-KFL5	532-51013
Ringlight, indirect, 75 mm, white	LR 75 WI-24-KFL5	532-51014
Ringlight, indirect, 130 mm, white	LR 130 WI-24-KFL5	532-51015
Ringlight, indirect, 75 mm, red	LR 75 RI-24-KFL5	532-51016
Ringlight, indirect, 130 mm, red	LR 130 RI-24-KFL5	532-51017
Arealight, diffuse, 36 mm, white	LF 36 WD-24-KFL5	532-51018
Arealight, diffuse, 51 mm, white	LF 51 WD-24-KFL5	532-51019
Arealight, diffuse, 100 mm, white	LF 100 WD-24-KFL5	532-51020
Arealight, diffuse, 36 mm, red	LF 36 RD-24-KFL5	532-51021
Arealight, diffuse, 51 mm, red	LF 51 RD-24-KFL5	532-51022
Arealight, diffuse, 100 mm, red	LF 100 RD-24-KFL5	532-51023
Arealight, diffuse, 200 mm, white	LF 200 WD-24-KFL5	532-51024
Arealight, diffuse, 200 mm, red	LF 200 RD-24-KFL5	532-51025
Light bar, diffuse, 44 mm, white	LB 44 WD-24-KFL5	532-51026
Light bar, diffuse, 86 mm, white	LB 86 WD-24-KFL5	532-51027
Light bar, diffuse, 44 mm, red	LB 44 RD-24-KFL5	532-51028
Light bar, diffuse, 86 mm, red	LB 86 RD-24-KFL5	532-51029
Ringlight, indirect, diffuse, 70 mm, white	LR 70 WID-24-KFL5	532-51030
Ringlight, indirect, diffuse, 100 mm, white	LR 100 WID-24-KFL5	532-51031
Ringlight, indirect, diffuse, 70 mm, red	LR 70 RID-24-KFL5	532-51032
Ringlight, indirect, diffuse, 100 mm, red	LR 100 RID-24-KFL5	532-51033
Ringlight, diffuse, 70 mm, white	LR 70 WD-24-KFL5	532-51034
Ringlight, diffuse, 100 mm, white	LR 100 WD-24-KFL5	532-51035
Ringlight, diffuse, 70 mm, red	LR 70 RD-24-KFL5	532-51036
Ringlight, diffuse, 100 mm, red	LR 100 RD-24-KFL5	532-51037
Ringlight, dome, diffus, 50 mm, white	LD 50 WD-24-KFL5	532-51038
Ringlight, dome, diffus, 50 mm, red	LD 50 RD-24-KFL5	532-51039
Coaxiallight, directed, 25 mm, red	LK 25 R-24-KFL5	532-51043
Coaxiallight, directed, 46 mm, red	LK 46 R-24-KFL5	532-51044
Connection adapter with switching amplifier for LED illumination	LA45 V-24-3L	525-01000
Illumination cable 2x M12/ 8pin, 0,5m, straight, shielded	CB L8FSK/L8FSK- 0,5m-GG-PUR	902-51717
Illumination cable 2x M12/ 8pin, 2m, straight, shielded	CB L8FSK/L8FSK- 2m-GG-PUR	902-51719

Description	Designation	Article N°
Illumination cable 2x M12/ 8pin, 0,5m, 90°, shielded	CB L8FSK/L8FSK-0,5m-WW-PUR	902-51718
Illumination cable 1x M12/ 4pin, 10m, for direct connection of pos. 532-51000 to 532-51039	CB L4 MG 10m PUR	902-51756
Mounting angle, illumination, ring light, diameter 18 mm	MA LR-18/112	543-11016
Mounting angle, illumination, ring light, diameter 23 mm	MA LR-23/112	543-11019
Mounting angle, illumination, ring light, diameter 26 mm	MA LR-26/112	543-11017
Mounting angle, illumination, ring light, diameter 50 mm	MA LR-50/112	543-11018
Mounting angle, illumination, ring light, diameter 104 mm	MA LR-104/112	543-11015
Anybus Communicator [4]	Profibus Plugadapter	902-51735
IO-Box FA 45	T-AS7T-12ET34RPD	533-01008

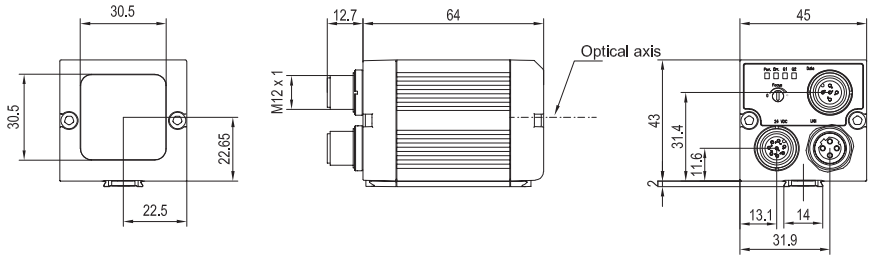
Adapters providing field wiring means are available from the manufacturer.

[1] Maximum length of lens = 42 mm; maximum diameter of lens = 39 mm
[2] IR illumination is only possible with C-Mount smart cameras.
[3] Mounting rail included.
[4] Functions only with interface cable (CI L5FK-xm-x-PUR)

8.5 Dimensional drawings

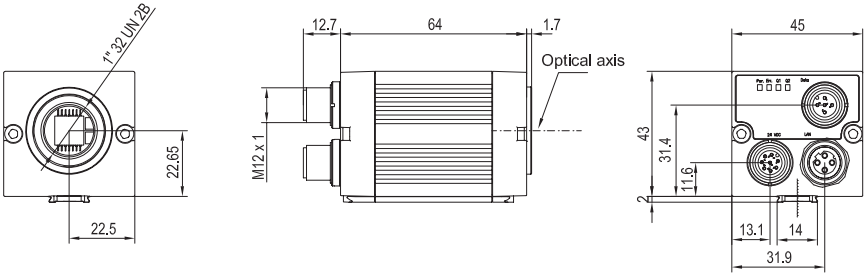
FA 45-300-x xxx-xx Ox H S6

153-00422



FA 45-300-x xxx-xx OCS H S6

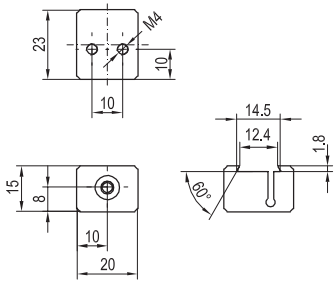
153-00434



Mounting clamp MK 45

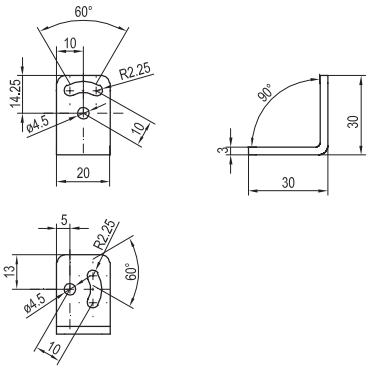
153-00480

(supplied with smart camera)



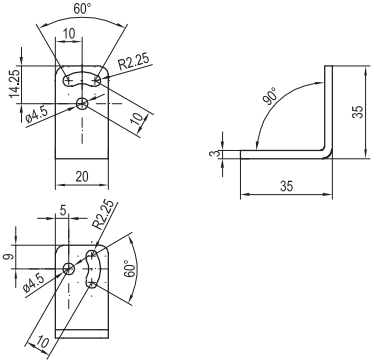
Mounting angle MA 45

153-00482



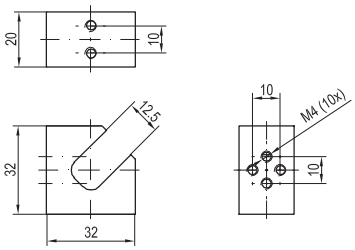
Mounting angle MA 45 L

153-00600



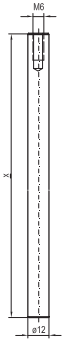
Mounting block rod MB 45

153-00481



Mounting rod MST 45-x

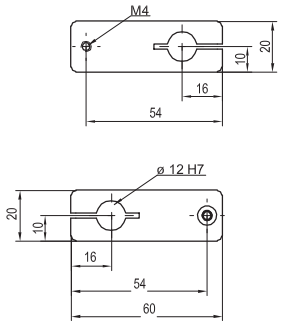
153-00545



x = 200	MST 45-20
x = 300	MST 45-30
x = 400	MST 45-40

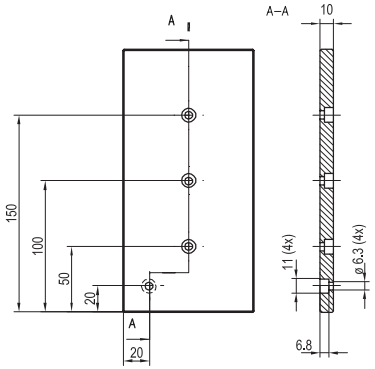
Mounting link MZ 45

153-00546



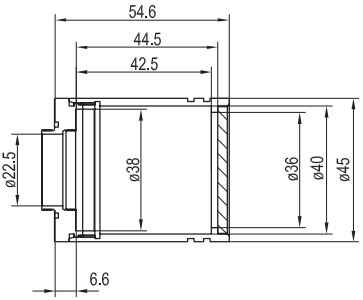
Mounting plate MP 45

153-00547



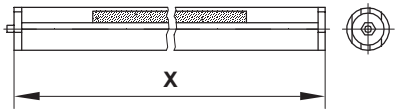
Mounting plate MP 45

153-00547

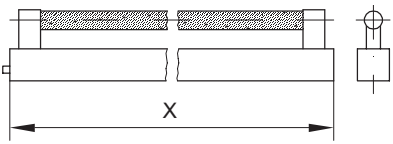


I) Illumination LZS

153-00202/153-00203

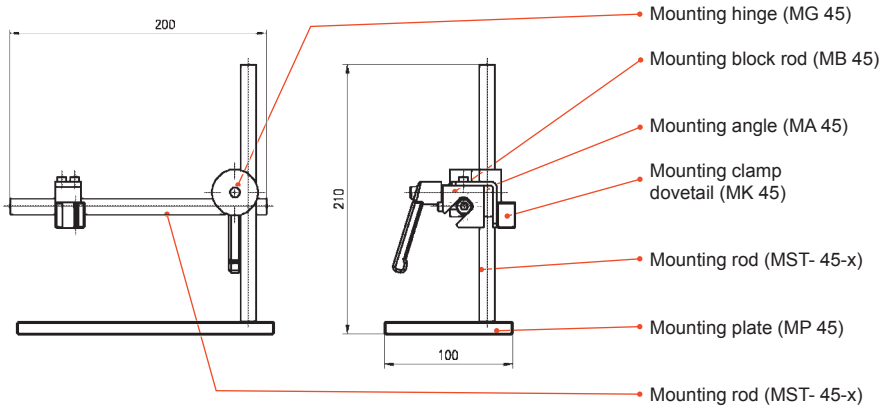


II) Illumination LZS



Example of a retaining device (for individual parts see chapter 8.10)

153-00435



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